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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/812,763

03/29/2004

Yoshiyuki Nakane

5095-4085

7323

27123 7590 07/10/2007
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EXAMINER

DAVIDSON, DREW ALAN

ART UNIT

PAPER NUMBER

3709

MAIL DATE

DELIVERY MODE

07/10/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/812,763

Applicant(s)

NAKANE ET AL.

Examiner

Drew Davidson

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>11/04, 3/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 5, 6, 7, 12, 13, 16, 17, 18, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laskey et al. (U.S. Pat. 3,211,362) in view of Kushiro et al. (JP 61200391 A).

Regarding claim 1:

Laskey et al. '424 discloses a compressor (item 26 in Fig. 1) having a compression-chamber from which gas is discharged and an adjoining intercooler/second-cooling-chamber (item 28 in Fig. 1) having a passage (spiral space occupied by fins 128 in Fig. 3 and 4) for discharged air and a water-passage/medium-passage (items 120 and 122 in Fig. 1, 4:12-16, 1:67-71, 4:1-7, 6:23-36). The water/medium passage taught by Laskey et al. '362 is capable of restraining transmission of heat from the air-gas/passage to all matter surrounding the intercooler-assembly, because the temperature of the discharged air/gas is reduced by heat

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transferred to the water, thus lessening/restraining the heat transferred between the discharged air/gas and said matter.

Laskey et al. '424 do not teach a first cooling chamber. Kushiro et al. '391 teach a scroll compressor having a first cooling chamber (item 1b in Fig. 1) adjoining the scroll. Laskey et al. '362 and Kushiro et al. '391 are analogous art because they are concerned with the same field of endeavor of cooling in compressors. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have provided the first cooling chamber adjoining the compression chamber taught by Kushiro et al. '391 to adjoin the compression chamber in the compressor of Laskey et al. '362, with the first cooling chamber (Kushiro et al. '391) also adjoining the intercooler/second-cooling-chamber (Laskey et al. '362). The motivation would have been directly cool the compression chamber as suggested by Kushiro et al. '391, and to form a compact, single-piece assembly as taught by Laskey et al. '362 (1:47-51).

Regarding claims 2 and 13:

Official notice is taken that it was well-known to a person having ordinary skill in the art at the time applicants' invention was made to have arranged piping for multiple cooling units in either series or parallel, so as to have delivered coolant to the first-cooling-chamber (Kushiro et al. '391) and the intercooler/second-cooling-chamber (Laskey et al. '362) in either series or parallel. It would have been more economical to use a single cooling circuit for both chambers. Selection between series or parallel

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would have hinged on considerations of economy, optimization of cooling rate, and minimization of required coolant pumping power.

Regarding claims 5, 6, 16, and 17:

Laskey et al. '362 teach a turbine (item 24 in Fig. 1) driving the compressor.

Laskey et al. '362 do not teach an electric motor. Kushiro et al. '391 teach a compressor comprising an electric motor (item 14 in Fig. 1) arranged in the compressor and capable of driving it, with a coolant jacket (item 3a in Fig. 1) covering the electric motor, the coolant jacket having passages capable of directing flowing water. Kushiro et al. '391 teach coolant piping leading from the motor coolant jacket to the first cooling chamber adjoining the compression chamber (Fig. 1). At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have added the electric motor, the motor cooling jacket, and the coolant piping to and from the motor cooling jacket taught by Kushiro et al. '391 to the apparatus of Laskey et al. '362. The motivation would have been to drive the compressor, achieve a compact single-housing apparatus, and control motor temperature using a single coolant circuit for economy.

Regarding claims 7 and 18:

The compressor structure taught by Laskey et al. '362 appears to be capable of compressing gas and supplying it to a fuel cell.

Regarding claims 12 and 23:

The compressor structure taught by Laskey et al. '362 appears to be capable of compressing one of gaseous air and gaseous hydrogen.

Claims 3 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laskey et al. (U.S. Pat. 3,211,362) in view of Kushiro et al. (JP 61200391 A) as applied to claims 2 and 13 above, and further in view of Dewar et al. (U.S. Patent 5,626,188).

Laskey et al. '362 teach the basic apparatus as set forth above.

Regarding claims 3 and 14:

Laskey et al. '362 does not teach the gas passage in the intercooler/second-cooling-chamber to not adjoin the first-cooling-chamber taught by Kushiro et al. '391. Dewar et al. '188 teach a parallel-plate-heat-exchanger/intercooler in which two fluids flow in alternating cavities between parallel plates (1:14-22, Fig. 2). Laskey et al. '362 and Dewar et al. '188 are analogous art because they are concerned with the same technical difficulty, i.e. exchanging heat between two separate fluids. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have used a parallel-plate-heat-exchanger (Dewar et al. '188) as the intercooler/second-cooling-chamber (Laskey et al. '362), and to have experimented between either coolant/medium or gas in the passage of the parallel-plate-heat-exchanger immediately adjoining the first-cooling-chamber taught by Kushiro et al. '391; having chosen water/medium in said immediately adjoining passage, the gas passage would not have adjoined the water-jacket/first-cooling-chamber. The motivation would have been that Dewar et al. '188 suggest that a parallel-plate-heat-exchanger is an equivalent and alternative form for an intercooler/second-cooling chamber.

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Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laskey et al. (U.S. Pat. 3,211,362) in view of Kushiro et al. (JP 61200391 A) as applied to claims 2 and 13 above, and further in view of Cowans (U.S. Patent 3,608,629).

Laskey et al. '362 teach the basic apparatus as set forth above.

Regarding claims 4 and 15:

Laskey et al. '362 do not teach the gas passage in the intercooler/second-cooling-chamber to partially adjoin the first-cooling-chamber taught by Kushiro et al. '391. Cowan et al. '629 teach a counterflow-heat-exchanger/second-cooling-chamber in which two fluids (A and B in Fig. 4) flow in alternate cavities in a checkerboard fashion (Fig. 3, Fig. 4, 4:28-59). Laskey et al. '362 and Cowan et al. '629 are analogous art because they are concerned with the similar technical difficulty of exchanging heat between two separate fluids. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have used a counterflow-heat-exchanger (Cowan et al. '629) as the intercooler/second-cooling-chamber (Laskey et al. '362), such that the gas passage would have partially adjoined the first-cooling-chamber taught by Kushiro et al. '391. The motivation would have been that Cowan et al. '629 suggest that a counterflow-heat-exchanger is an equivalent and alternative form for an intercooler/second-cooling-chamber.

Claims 8, 10, 11, 19, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laskey et al. (U.S. Pat. 3,211,362) in view of Kushiro et al. (JP

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61200391 A) as applied to claims 2 and 13 above, and further in view of Edmund (U.S. Patent 3,151,672).

Laskey et al. '362 teach the basic apparatus as set forth above.

Regarding claims 8 and 19:

Laskey et al. '362 do not teach the medium passage in the intercooler/second-cooling-chamber to comprise a plurality of branched tubes. Edmund '672 teaches an air-cooler/intercooler (item AC in Fig. 1) wherein the inner-tube/medium-passage comprises a plurality of branched tubes (item 12 in Fig. 2) through which water/medium flows (arrows, water inlet 3, outlet 4 in Fig. 2), the air/gas passage provided by space outside the branched tubes (arrows, air inlet 1 and outlet 2 in Fig. 2), a fin (items 13 in Fig. 2) in the air/gas passage. Laskey et al. '362 and Edmund '672 are analogous art because they are concerned with the similar technical difficulty of cooling compressed gas. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have used the air-cooler taught by Edmund '672 as the intercooler/second-cooling-chamber in the device of Laskey et al. '362. The motivation would have been that Edmund '672 suggests that an air-cooler is an equivalent and alternative form for an intercooler/second-cooling-chamber.

Regarding claims 10 and 21:

Edmund '672 teaches the plurality of branched tubes to have cylindrical cross-sections (item 12 in Fig. 2; Fig. 3 shows the cylindrical cross-section).

Regarding claims 11 and 22:

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Edmund '672 teaches the tubes to be spaced from the outer wall of the air-cooler/intercooler (see tube 12 and outer wall 11 in Fig. 3).

Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laskey et al. (U.S. Pat. 3,211,362) in view of Kushiro et al. (JP 61200391 A) as applied to claims 2 and 13 above, and further in view of Shimada et al. (U.S. Patent 4,615,384).

Laskey et al. '362 teach the basic apparatus as set forth above.

Regarding claims 9 and 20:

Laskey et al. '362 do not teach the medium passage in the intercooler/second-cooling-chamber to comprise a plurality of branched tubes. Shimada et al. '384 teach an evaporator/intercooler in Fig. 1 having a medium passage (item 4 in Fig. 1) consisting of a plurality of flat, branched tubes (item 5 in Fig. 1) and a gas passage provided by spaces (item 6 in Fig. 1) outside the tubes containing a fin (item 7 in Fig. 1, 1:22-34). Laskey et al. '362 and Shimada et al. '384 are analogous art because they are concerned with the similar technical difficulty of exchanging heat between two fluids. At the time applicants' invention was made, it would have been obvious to a person having ordinary skill in the art to have used the evaporator/intercooler taught by Shimada et al. '384 (Fig. 1) as the intercooler/second-cooling-chamber in the device of Laskey et al. '362. The motivation would have been that Shimada et al. '384 suggest that the evaporator/intercooler (Fig. 1) is an equivalent and alternative form for an intercooler/second-cooling-chamber.

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Prior Art

Prior Art made of record but not relied upon is considered pertinent to Applicants' disclosure and consists of three patents. Schaffer (U.S. Patent 3,994,633) teaches a scroll apparatus/compressor having a channel/first-cooling-chamber (item 22 in Fig. 1) adjoining the compression chamber through which a fluid coolant is circulated (7:16-24). Moroi et al. '268 teach a scroll compressor driven by an electric motor with a water jacket. Schnell '424 teach a compressor with a compression chamber covered on all sides by cooling water passages.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Drew Davidson whose telephone number is (571)270-3290. The examiner can normally be reached on Monday through Friday 8:30 AM through 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Eashoo can be reached on (571)272-1197. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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D. D.



MARK EASHOO, PH.D
PRIMARY EXAMINER

03 / Jul / 07